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(54) HAIR SPRAYS

(71) We, UNILEVER LIMITED, a company organised under the laws of Great Britain, of Unilever House, Blackfriars, London E.C.4, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to hair sprays and in particular to aerosol hair sprays.

While there are currently marketed many aerosol hair spray products which give satisfactory hold to the hair, it is the complaint of many users that this hold in at the sacrifice of the natural softness or feel of the hair. We have now developed after much research an aerosol hair spray product which to a high degree combines the generally desired properties of providing adequate hold and imparting a natural feel to the hair.

According to the invention there is provided an aerosol hair spray composition comprising (i) a blend of film-forming resins being a mixture of (a) a copolymer of vinyl acetate and crotonic acid having a glass transition temperature (T_g) of 22—26°C, and (b) a copolymer of vinyl acetate and vinyl pyrrolidone having a T_g of 40—45°C; (ii) a neutralising agent for the vinyl acetate/crotonic acid copolymer; (iii) an organic solvent; and (iv) a propellant. The particular choice of the resin component is an essential feature of this invention. Numerous other resin blends that have been investigated have proved to be inferior to the one employed in the present invention.

The film forming resins (a) and (b) should be used in a weight ratio of 3:1 to 1:4, particularly 3:2 to 2:3. The resin blend may suitably amount to 1% to 3% by weight of the aerosol composition: preferred amounts are 1.2% to 2%.

Suitable neutralising agents for the vinyl

acetate/crotonic acid copolymer are amines, especially aminohydroxy compounds having a molecular weight of at least 75 and a boiling point of at least 159°C at atmospheric pressure. Examples of suitable aminohydroxy compounds are 3-amino-1-propanol and 1-amino-2-propanol but preferred as neutralising agents are those aminohydroxy compounds described in British Patent Specification 856,403 which have molecular weights above 85 and boiling points above 160°C. Examples of these are:

2-amino-2-methyl-1,3-propanediol
 2-amino-2-ethyl-1,3-propanediol
 2-amino-2-methyl-1-propanol
 tris(hydroxymethyl)-aminomethane
 2-amino-2-methyl-2-pentanol
 1-amino-2-methyl-2-propanol
 3-amino-2-pentanol
 2-amino-1-phenyl-1-butanol
 2-dimethylamino-2-methyl-1-propanol
 N^1 - (2 - hydroxyethyl) - 2 - methyl - 1,2 - propanediamine
 tris(hydroxymethyl)dimethylaminomethane
 2 - dimethylamino - 2 - methyl - 1,3 - propanediol

It is desirable that the amount of neutralising agent employed should be that which neutralises the vinyl acetate/crotonic acid copolymer to the extent of at least 10% up to 100%, but preferably from 25 to 90%.

As is usual with aerosol hair sprays, the composition of the invention includes an organic solvent for the resin film-forming agents. Ethyl alcohol and isopropyl alcohol and mixtures thereof are the preferred solvents although methylene chloride may also be used, desirably in admixture with ethyl alcohol or isopropyl alcohol. The amount employed will usually be from 5 to 80% by weight of the total hair spray composition, preferred amounts being from 20 to 70% by weight.

The remaining principal component of the aerosol hair spray composition of the invention is the aerosol propellant. Conventional liquefied gaseous fluorocarbon propellants are preferably used. Preferred are trichlorofluoromethane, dichlorodifluoromethane, tetrafluorodichloroethane and mixtures thereof.

Other conventional ingredients in minor proportion which can be included are perfumes and silicones.

The following example of an aerosol hair spray illustrates the invention. Percentages are by weight.

Example

An aerosol hair spray was made having the following composition.

	%
Aristoflex A	0.900
Luviskol VA 28 I	1.800
2-amino-2-methyl-1-propanol	0.019
Industrial Methylated Spirit	37.281
Propellant Mixture	
(65% trichlorofluoromethane	
35% dichlorodifluoromethane)	60.000
"Aristoflex" and "Luviskol" are Trade Marks.	

Aristoflex A is a copolymer of vinyl acetate and crotonic acid having a Tg of 24°C and Luviskol VA 28 I is a 50% solution in isopropyl alcohol of a copolymer of vinyl acetate and vinyl pyrrolidone having a Tg of 42°C.

The above product has been found in a consumer test to be well liked by many of the users, the product being judged to give adequate holding properties and to leave the hair soft and manageable. Amongst those users who regarded as important attributes of a hair spray its ability to leave the hair looking and feeling natural, not being left stiff or stocky after use of the hair spray, and easily brushed out, the product of the invention was preferred to all others used in the test.

A salon trial was carried out to compare two products of the invention having differing resin ratios. In one product, Product A, the ratio of the Aristoflex A:Luviskol VA 28 I was 1:1 and in the other, Product B, the ratio was 1:4. The formulae were as given below:

	Product A	Product B
Aristoflex A	1.125	0.45
Luviskol VA 28 I	2.250	3.60
2-amino-2-methyl-1,3-propanediol	0.025	0.01
Industrial Methylated Spirit	36.600	35.94
Propellant Mixture		
(65% trichlorofluoromethane		
35% dichlorodifluoromethane)	60.000	60.00

On the first five days of both weeks of the test period daily applications of the two test products were made, one to each side of the head of a number of panellists. As much hairspray was applied to the head as was considered necessary by the hairdresser for the style and type of the hair. An equal amount of hairspray was applied to each side of the head. The same product was used on the same side of the head throughout the first week, then the products were reversed to the opposite side of the head for the second test week. Assessments of the hair by the hairdresses were made on the first two and last two days of each of the five test days of each week. In this trial the two products were judged to impart similar hold to the hair and both products were judged to leave the hair with a natural feel. The two products were not reckoned to be significantly different in these two respects.

WHAT WE CLAIM IS:—

1. An aerosol hair spray composition comprising (i) a blend of film-forming resins being a mixture of (a) a copolymer of vinyl acetate and crotonic acid having a glass transition temperature of 22 to 26°C, and (b)

a copolymer of vinyl acetate and vinyl pyrrolidone having a glass transition temperature of 40 to 45°C, the copolymers (a) and (b) being present in a weight ratio of 3:1 to 1:4; (ii) a neutralising agent for copolymer (a); (iii) an organic solvent for the film-forming resins; and (iv) an aerosol propellant.

2. An aerosol hair spray composition as claimed in claim 1, wherein the copolymer (a) has a glass transition temperature of 24°C.

3. An aerosol hair spray composition as claimed in claim 1 or claim 2, wherein the copolymer (b) has a glass transition temperature of 42°C.

4. An aerosol hair spray composition as claimed in any of the preceding claims wherein the copolymers (a) and (b) are present in a weight ratio of 3:2 to 2:3.

5. An aerosol hair spray composition as claimed in claim 4 wherein the copolymers (a) and (b) are present in a weight ratio of about 1:1.

6. An aerosol hair spray composition as claimed in any of the preceding claims wherein the resin mixture amounts to 1 to 3% by weight of the composition.

7. An aerosol hair spray composition as claimed in any of the preceding claims wherein the amount of the neutralising agent is sufficient to neutralise copolymer (a) to the extent of at least 10%.
8. An aerosol hair spray composition as claimed in claim 7 wherein the amount of the neutralising is sufficient to neutralise copolymer (a) to the extent of 25 to 90%.
9. An aerosol hair spray composition as claimed in any of the preceding claims wherein the neutralising agent is an aminohydroxy compound having a molecular weight of at least 75 and a boiling point of at least 159°C at atmospheric pressure.
10. An aerosol hair spray composition as claimed in claim 9 wherein the neutralising agent is 3-amino-1-propanol, 1-amino-2-propanol, 2-amino-2-methyl-1,3-propanediol or 2-amino-2-methyl-1-propanol.
11. An aerosol hair spray composition as claimed in any of the preceding claims wherein the organic solvent is ethyl alcohol, isopropyl alcohol, methylene chloride or a mixture thereof.
12. An aerosol hair spray composition as claimed in any of the preceding claims wherein the amount of the organic solvent is 5 to 80% by weight of the composition.
13. An aerosol hair spray composition as claimed in claim 12 wherein the amount of the organic solvent is 20 to 70% by weight of the composition.
14. An aerosol hair spray composition as claimed in any of the preceding claims wherein the propellant is a liquefied gaseous fluorocarbon propellant.
15. An aerosol hair spray composition as claimed in claim 14 wherein the propellant is trichlorofluoromethane, dichlorodifluoromethane, tetrafluorodichloroethane or a mixture thereof.
16. An aerosol hair spray composition substantially as described herein with reference to the Example or Product A or Product B.

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